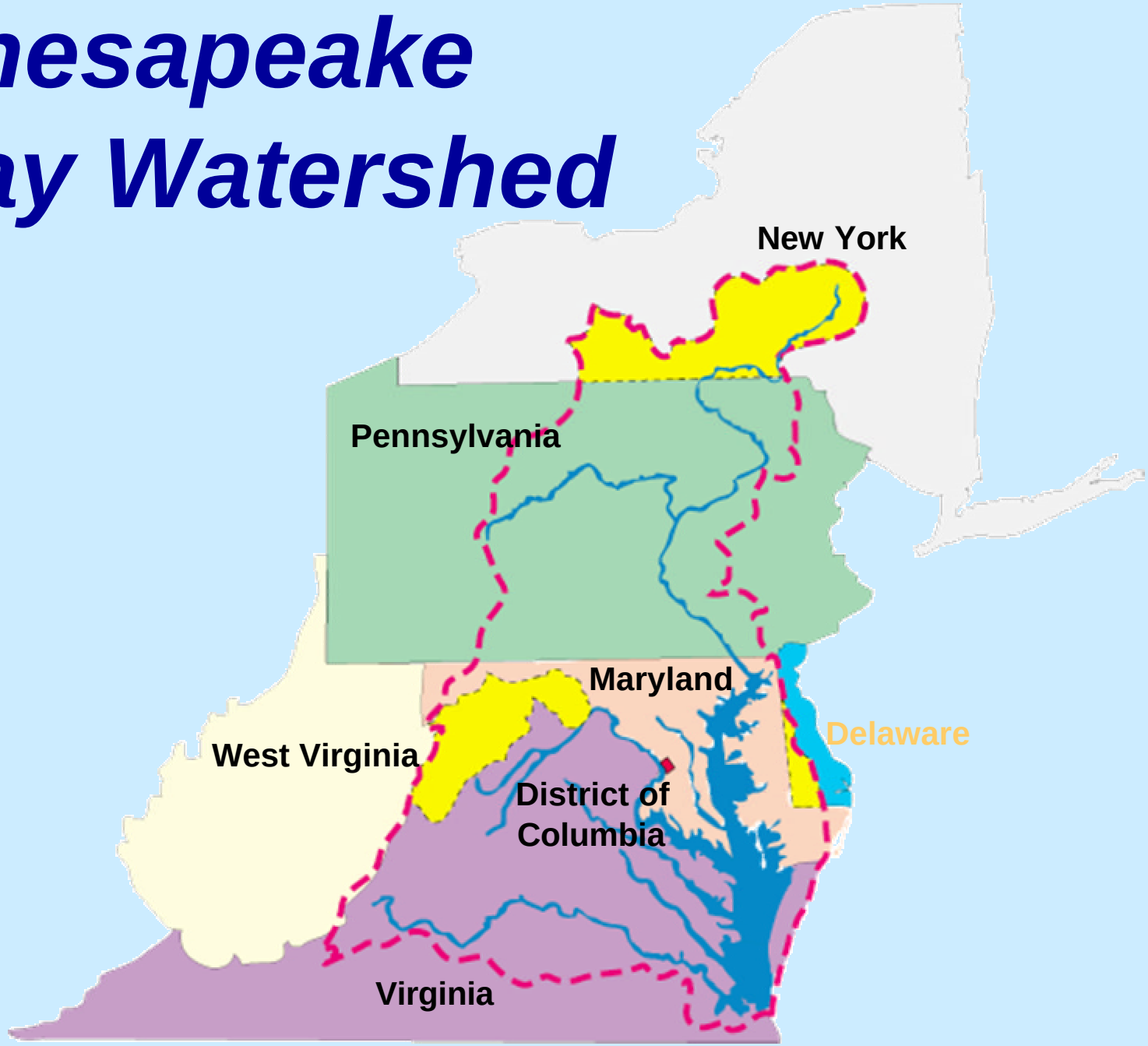
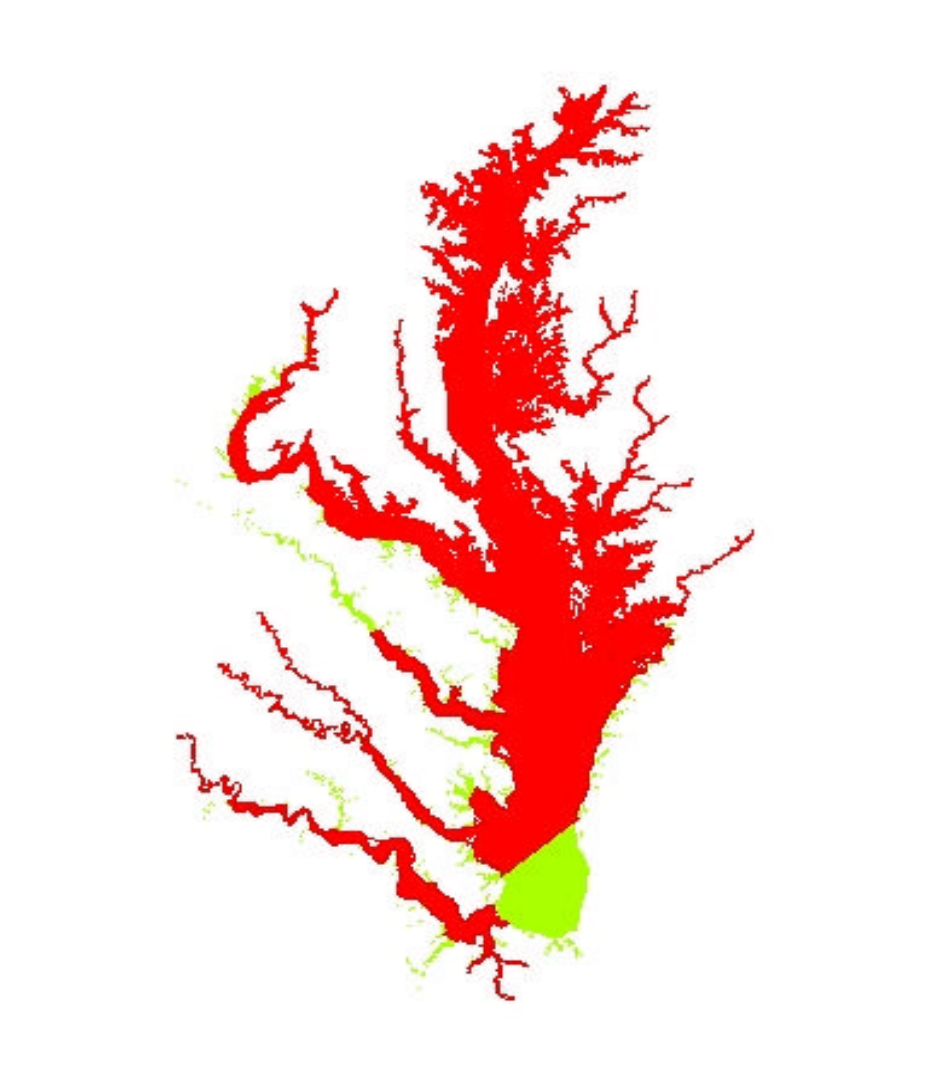
Regulations For Point Source Discharges of Nitrogen and Phosphorus within the Virginia Chesapeake Bay Watershed

Chesapeake Bay Watershed



Impaired Chesapeake Bay

Portions of the Chesapeake Bay and its tidal rivers are listed under the Clean Water Act as “impaired waters” largely because of low dissolved oxygen levels and other problems related to nutrient pollution.



Chesapeake 2000 Agreement and Nutrient Reduction Commitments

- Improving water quality is the most critical element in the overall protection and restoration of Chesapeake Bay and its tributaries.
- Goal for Nutrients: ***By 2010, correct the nutrient-related problems in the Bay and its tributaries sufficiently to remove these waters from the list of impaired waters.***

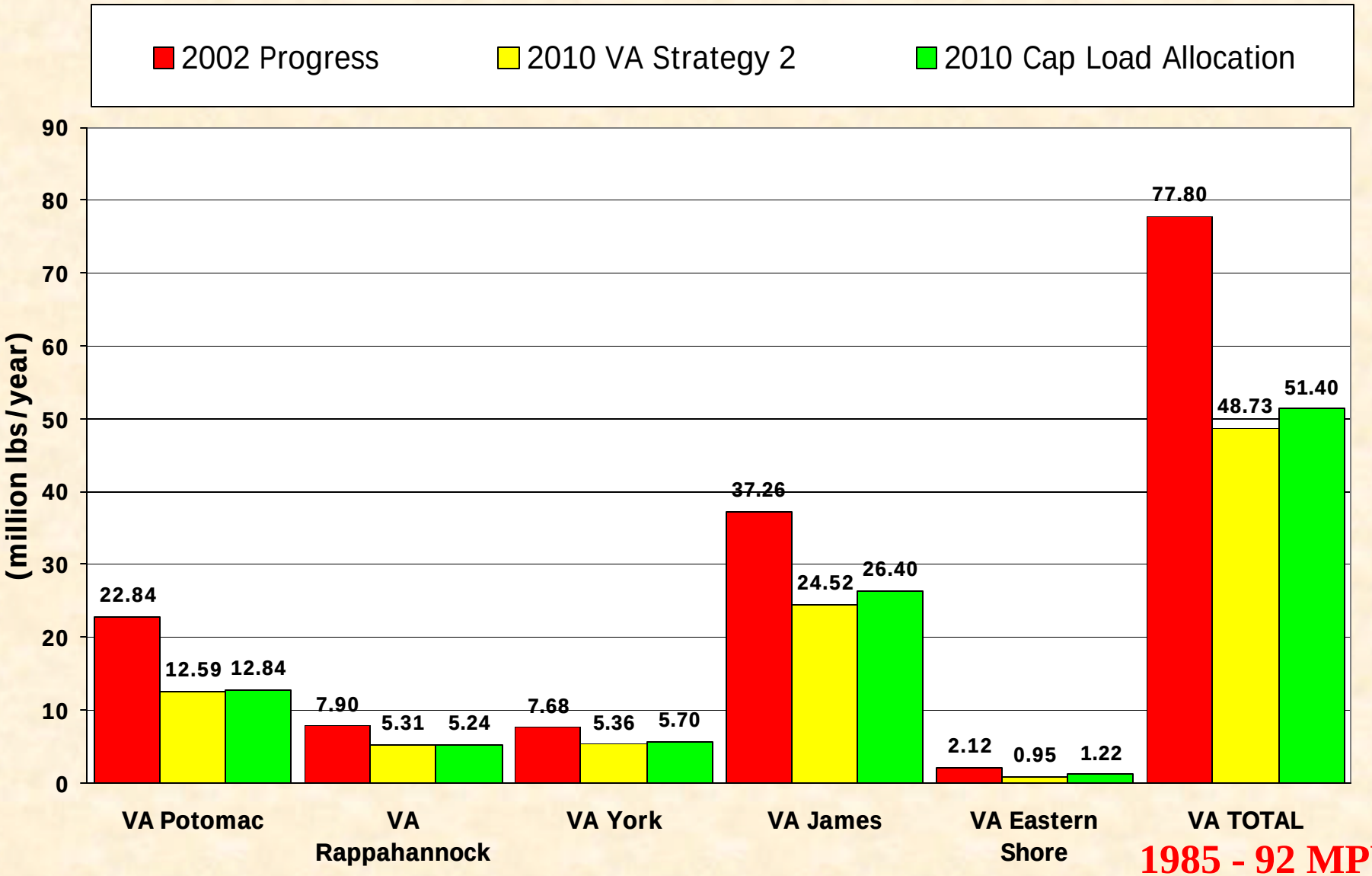
STEPS TO CHESAPEAKE BAY RESTORATION – POINT SOURCES

- **Water Quality Criteria** - published by EPA in 2003
- **Load Allocations** - for nitrogen, phosphorus and sediment assigned to river basins by CBP in 2003
- **Tributary Strategies** – drafts for 5 VA basins developed; point source statement released by Secretary Murphy
- **VA Water Quality Standards** – proposed revisions approved by Board in June for public comment
- **Point Source regulations** – today's proposals; one to set nutrient removal technology and other for load allocations
- **Permit Limits** - now and after regulations adopted
- **Who Pays?** - rate payers, land owners and taxpayers

Cap Load Allocations by State

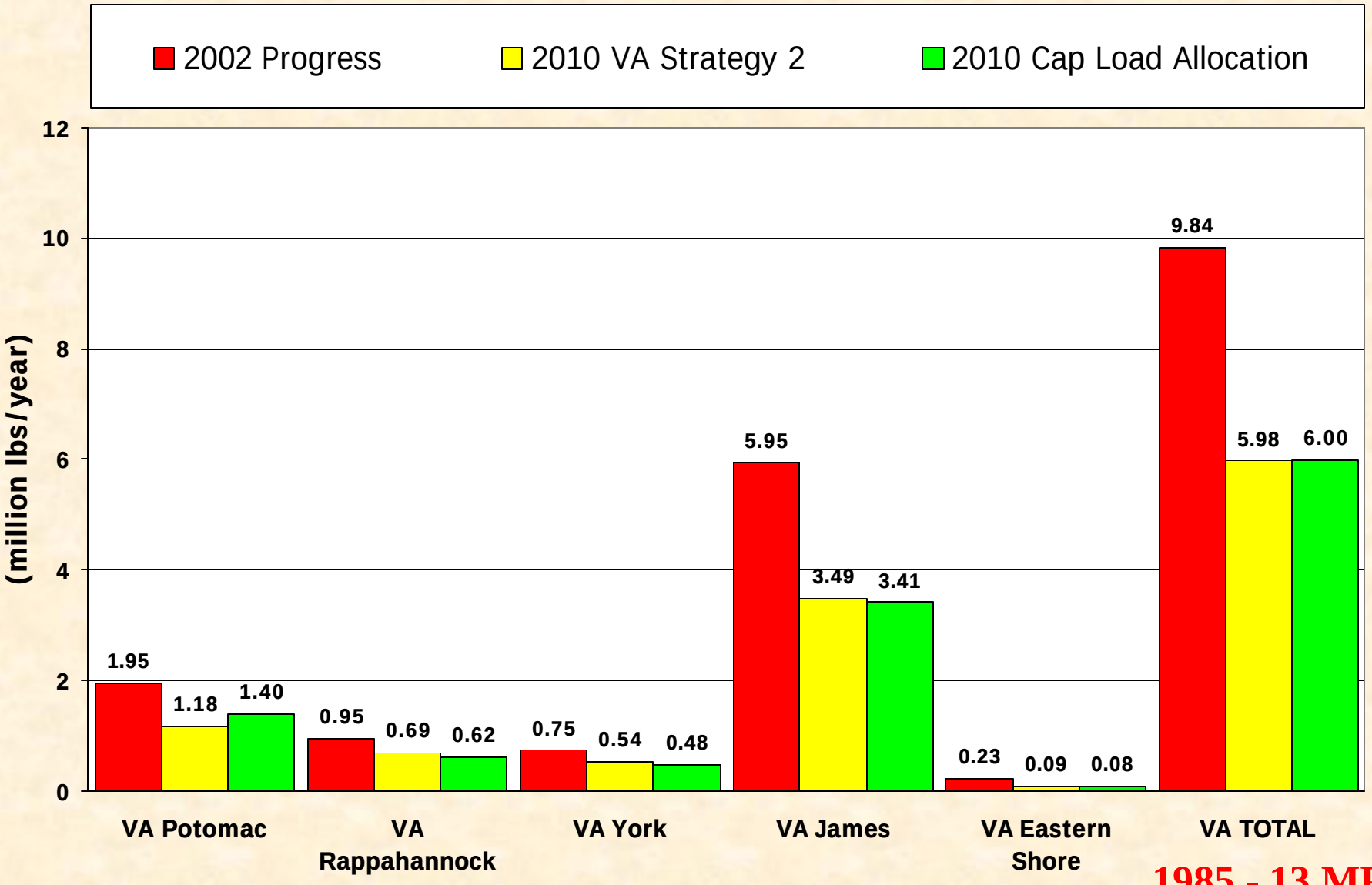
	Nitrogen Allocation (million pounds/year)	Phosphorus Allocation (million pounds/year)
PENNSYLVANIA	72	2.3
MARYLAND	37	2.9
VIRGINIA	51	6.0
DISTRICT OF COLUMBIA	2	0.3
NEW YORK	13	0.6
DELAWARE	3	0.3
WEST VIRGINIA	5	0.4
SUBTOTAL	183	12.8
CLEAR SKIES REDUCTION	-8	
BASIN-WIDE TOTAL	175	12.8

Virginia Nitrogen Loads and Cap Load Allocations



1985 - 92 MPY

Virginia Phosphorus Loads and Cap Load Allocations

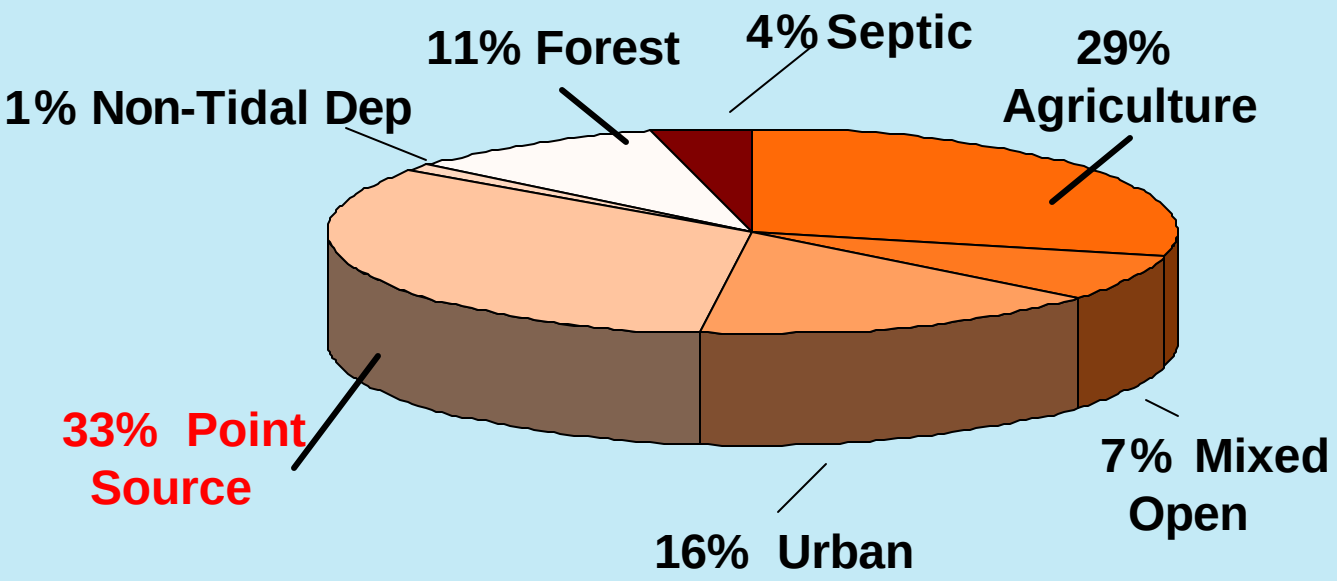


1985 - 13 MPY

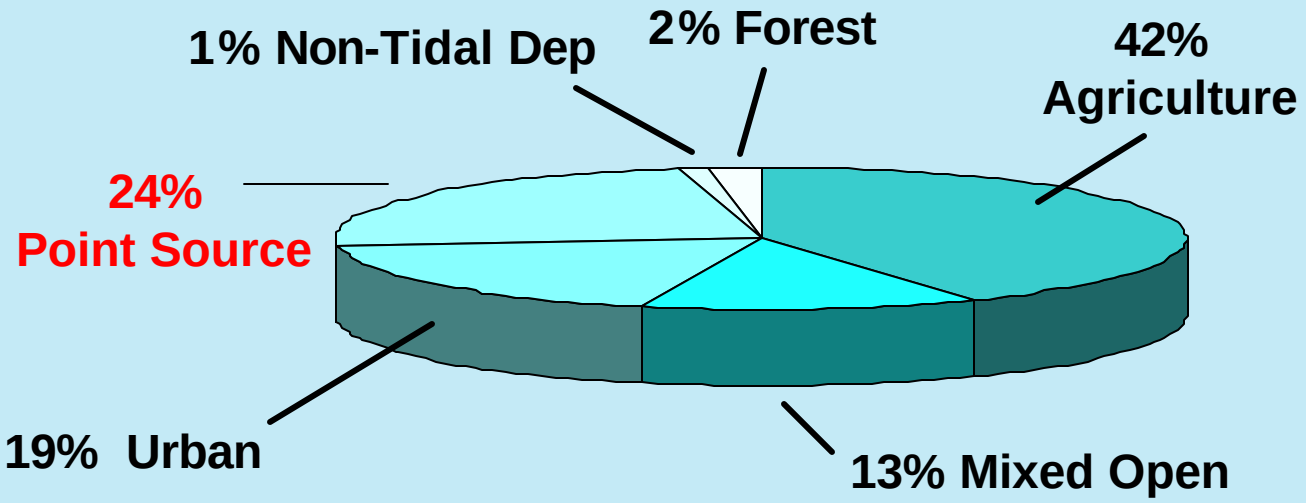
VA Sources of Nutrient Loads

2002

Nitrogen
Total Load =
77.8 million
pounds/year



Phosphorus
Total Load =
9.8 million
pounds/year

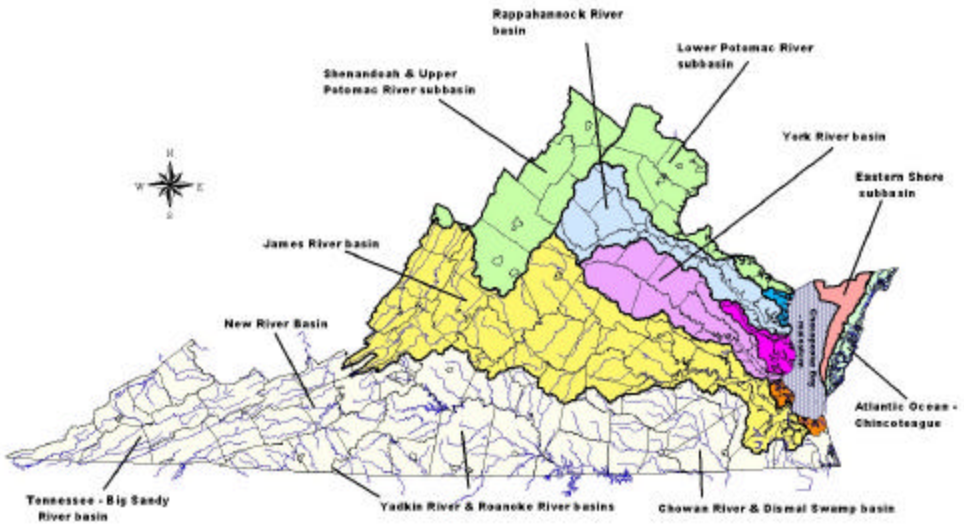


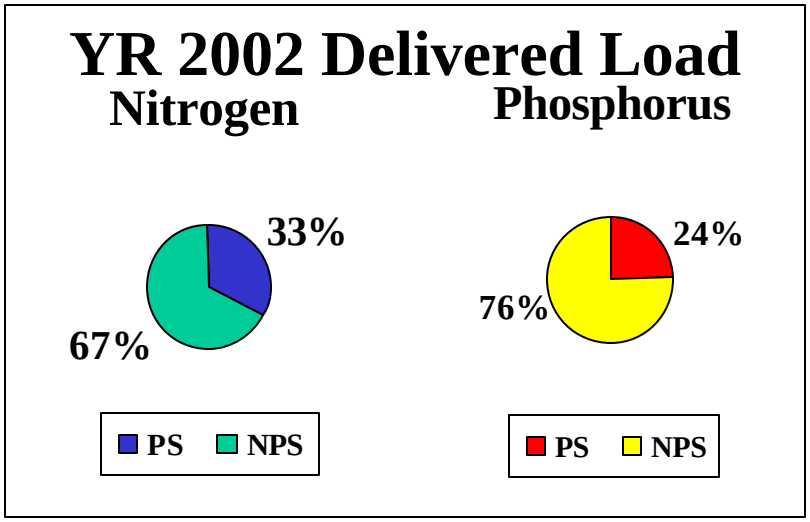
Virginia Experience with Point Source Nutrient Control

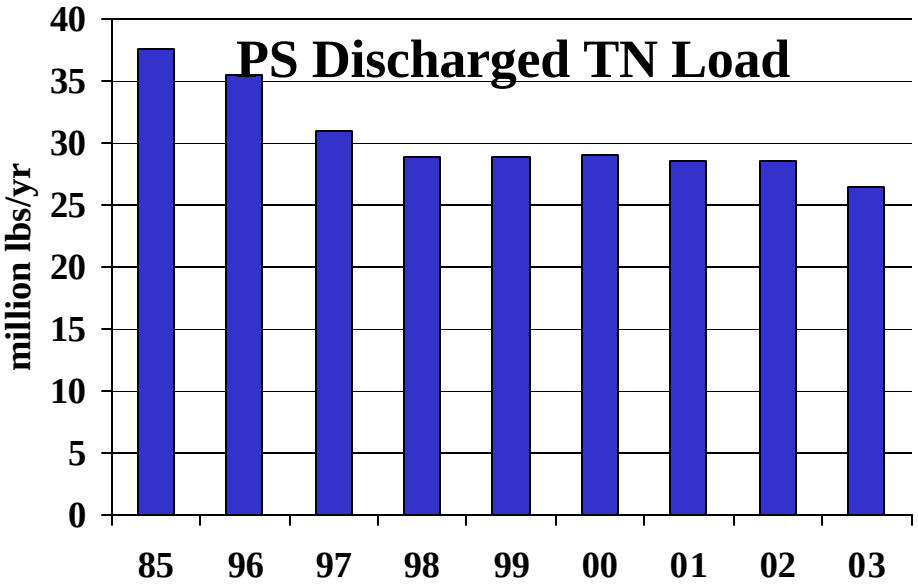
Combination of <u>regulatory</u> and <u>voluntary</u> measures:

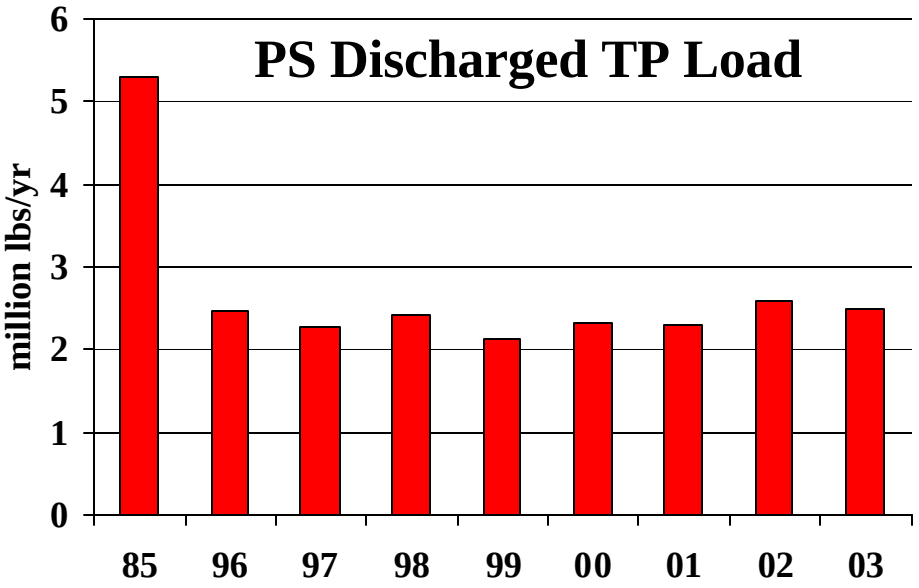
- Potomac Embayment Standards
- Occoquan/Dulles Area Watershed Policies
- Phosphate Detergent Ban
- Point Source Policy for Nutrient Enriched Waters
- WQIF Point Source Grant Program
- Industrial Pollution Prevention Activities

VA's Bay Watershed Nutrient Loads









PS facilities tracked: 90 municipal; 20 industrial; 23 WQIF projects

updated 8-11-04

Rulemaking Has Two Purposes

- Develop technology-based regulation for point source discharges of nutrients, as directed by Governor Warner

- Establish through regulation the nutrient load allocations for significant discharges within each river basin as identified through Tributary Strategies

Key Issues for Rulemaking

- Technology performance level?
- Permit averaging period?
- Size of facilities affected?
- Allowance for alternative limits?
- Establishment of nutrient load allocations
- Implementation schedules
- Trading, loading caps and future growth

Two Point Source Nutrient Regulations

Proposals must be considered together

- **Amend the *Policy for Nutrient Enriched Waters* (9 VAC 25-40)**
  - **Sets nutrient concentration limitations for point sources**
- **Amend the *Water Quality Management Planning Regulation* (9 VAC 25-720)**
  - **Sets nutrient load allocations for point sources**

Concentration and Load Allocations

Concentration x Flow x CF = Load

mg/l x MGD x CF = pounds/year

Example: POTW with capacity of 10 MGD assigned a load allocation of 120,000 pounds/year of nitrogen

- 4.5 MGD x 8.0 mg/l x CF = 110,000 pounds/year
- 6.5 MGD x 6.0 mg/l x CF = 120,000 pounds/year
- 10 MGD x 4.0 mg/l x CF = 120,000 pounds/year
- 13 MGD x 3.0 mg/l x CF = 120,000 pounds/year
- 15 MGD x 3.0 mg/l x CF = 140,000 pounds/year

Relation of Nitrogen Concentration and Load

For each 1 MGD [~10,000 people]:

Concentration	Annual Load
19 mg/l	58,000 lbs/yr
8.0 mg/l	24,000 lbs/yr
5.0 mg/l	15,000 lbs/yr
3.0 mg/l	9,000 lbs/yr

Regulation For Nutrient Enriched Waters and Dischargers Within the Chesapeake Bay Watershed

(9 VAC 25-40)

Overview

(9 VAC 25-40)

Proposed changes will:

- **Specify technology-based, annual average limits for nitrogen and phosphorus**
- **Authorize limits in VPDES permits of both existing and new or expanded dischargers**
- **Apply to certain dischargers in VA's Chesapeake Bay watershed**
- **Allow for alternative limits if discharger can demonstrate that specified levels cannot be achieved**

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Substance of Revisions to (9 VAC 25-40)

(details)

- **New title: "*Regulation* for Nutrient Enriched Waters *and Dischargers within the Chesapeake Bay Watershed*"**
- **Retains Nutrient Enriched Waters designations and phosphorus control requirements outside the Chesapeake Bay watershed**
- **Refers to Water Quality Management Planning Regulation to make clear that nutrient control requirements are a combination of effluent <u>concentrations</u> and waste <u>load</u> allocations**

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Substance of Revisions to (9 VAC 25-40)

(details continued)

- **States as Board policy that:**

  Point source dischargers within Chesapeake Bay watershed *utilize Biological Nutrient Removal treatment or its equivalent whenever feasible.*

Substance of Revisions to (9 VAC 25-40)

(details continued)

- **Requirements for Significant Dischargers**
  - **Annual average effluent limits of 8.0 mg/l for total nitrogen; 1.0 mg/l for total phosphorus**
  - **Must also meet waste load allocations in WQMP Regulation**
  - **Achieve applicable limits within 4 years of next permit reissuance or major modification, but in no case later than December 31, 2010**

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Substance of Revisions to (9 VAC 25-40)

(details continued)

- **Requirements for all other plants not defined as Significant Dischargers**
  - **Applies to plants with design flow of 40,000 gpd or more**
  - **Annual average effluent limits of 8.0 mg/l for total nitrogen; 1.0 mg/l for total phosphorus**
  - **Achieve applicable limits within 4 years following next permit reissuance or major modification occurring after December 31, 2010**

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Substance of Revisions to (9 VAC 25-40)

(details continued)

- **Requirements for all new or expanded dischargers authorized to discharge after the effective date of this regulation with design flow of 40,000 gpd or more**
  - **Annual average effluent limits of 3.0 mg/l for total nitrogen; 0.3 mg/l for total phosphorus**

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Substance of Revisions to (9 VAC 25-40)

(details continued)

Alternative Effluent Limitations

- Case-by-case basis
- Discharger can demonstrate through treatability, engineering, or other studies that the applicable effluent limits above cannot be achieved
- Board will require alternative effluent limitations deemed appropriate
- Discharger must still meet applicable waste load allocation in WQMP regulation

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Substance of Revisions to (9 VAC 25-40)

(details continued)

Other Regulatory Requirements

- **Any other nutrient limits required by State or Federal law/regulation, more stringent than the limitations above, are not affected by this regulation**

Proposed Revisions to Water Quality Management Planning Regulation

(9 VAC 25-720)

Overview
(9 VAC 25-720)

Proposed changes will:

- **Establish annual point source nitrogen and phosphorus waste load allocations in each of VA's Chesapeake Bay tributary basins - based on *Tributary Strategies***
- **Authorize use of a watershed trading and offset program to assist in the nutrient reduction effort**

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Substance of Revisions to WQMP Regulation (9 VAC 25-720)
(details)

- **Add definitions for:**
  - **Chesapeake Bay Watershed = major Bay tributary basins (Shenandoah/Potomac, Rappahannock, York, James, E. Shore)**
  - **Delivered Waste Load = discharged load is adjusted by a "delivery factor" (calculated using CBP Watershed Model); accounts for any attenuation or change in load occurring from biological, chemical, and physical processes during riverine transport to tidal waters.**

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Substance of Revisions to WQMP Regulation (9 VAC 25-720)
(details)

- **Add definitions for:**
  - **Significant Discharger = all of 120 wastewater treatment plants listed in the river basin sections of this regulation; any new or expanded plant authorized by a VPDES permit issued after July 1, 2004 to discharge 2,300 lbs/yr or more of nitrogen and/or 300 lbs/yr or more of phosphorus [40,000 GPD or more].**
  - **Trading - transfer of nitrogen or phosphorus waste load allocations among point source dischargers. Does not include transfer of nitrogen for phosphorus, or the reverse.**

Waste Load Allocation Guiding Principals* (9 VAC 25-720)

- **Achieve the nutrient reductions necessary to restore the Chesapeake Bay and its tidal tributaries in the timeframe set by "C2K";**
- **Provide for the full use of existing design capacity at each of the significant municipal and industrial wastewater treatment plants; and,**
- **Apply currently available nutrient reduction technologies at these treatment plants.**

***Taken from SNR's Point Source Statement, August 27, 2004**

Setting Waste Load Allocations (9 VAC 25-720)

- **Significant Dischargers - municipal plants**

  - **Applies to Shenandoah, above-fall-line Potomac, Rappahannock, and Eastern Shore basins**
  - **Based on design flow**
  - **Load allocations based on annual average concentrations of 4.0 mg/l total nitrogen and 0.3 mg/l total phosphorus.**

  - **Applies to below-fall-line Potomac basin**
  - **Based on design flow**
  - **Load allocations based on annual average concentrations of 3.0 mg/l total nitrogen and 0.3 mg/l total phosphorus, unless existing permit requires lower effluent limits**

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Determining Waste Load Allocations (9 VAC 25-720)

- **Significant Dischargers in York and James basins**

  As indicated in the SNR Statement re: Point Sources:

  – **All allocations in these basins are considered "interim" pending adoption of new tidal water quality standards**

  – **This proposal includes point source allocations in those basins essentially the same as proposed in April 2004 draft strategies.**

Determining Waste Load Allocations (9 VAC 25-720)

- **Significant Dischargers in York and James basins**

  In recognition that 2010 is fast approaching, this rulemaking should proceed ahead with the "interim" allocations for the York and James basins. The current schedule anticipates Board action on the Water Quality Standards prior to final action on this regulation. This will allow time for adjustments to the allocations in these two basins, along with any additional public comment period as needed, before final Board action on the allocations.

Determining Waste Load Allocations (9 VAC 25-720)

- **Several municipal plants are assigned allocations that vary from those identified due to unusual conditions (e.g., protect receiving stream water quality, CSO localities, high-strength influent)**

- **Significant Dischargers - Industrial plants**
  - **individual determinations made for performance levels and resulting allocations, due to unique wastewater characteristics.**

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Substance of Revisions to WQMP Regulation (9 VAC 25-720)

(details)

Information included in waste load allocation tables for each river basin:

- CBP Watershed Model Segment
- Virginia Waterbody ID
- Discharger Name
- VPDES Permit No.
- Total Nitrogen [TN] Waste Load Allocation [pounds/year]
- TN Delivery Factor
- TN Delivered Waste Load Allocation [pounds/year]
- Total Phosphorus [TP] Waste Load Allocation [pounds/year]
- TP Delivery Factor
- TP Delivered Waste Load Allocation [pounds/year]

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Substance of Revisions to WQMP Regulation (9 VAC 25-720)
(details)

- **Establishes Trading and Offsets program, intended to:**
  - **enhance cost-effectiveness of achieving and maintaining waste load allocations in each basin**
  - **allow for new and expanded treatment plants in the future**

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Substance of Revisions to WQMP Regulation (9 VAC 25-720)

(details)

- **Trading and Offsets program:**
  - ***Trading allowed among significant dischargers only within the same basin***
  - ***Trades between nutrients not allowed***
  - ***No degradation or adverse impacts to local water quality, or standards violations***
  - ***Total delivered waste load allocation for that basin cannot be exceeded***
  - ***Board may authorize trades only through VPDES permits***

Substance of Revisions to WQMP Regulation (9 VAC 25-720) *(details)*

- **Nutrient loads from new or expanded significant dischargers that exceed allocation must be accompanied by:**
  - ***a trade for an equal or greater load reduction from one or more existing dischargers***
  - ***installation, monitoring, and maintenance of BMPs that reduce nonpoint source delivered loads by twice the amount of point source load increase being offset***
  - ***a combination of both actions***

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Substance of Revisions to WQMP Regulation (9 VAC 25-720)

(details)

- **Requirements that also apply if a new or expanded discharger uses offsets of nonpoint source BMPs:**
  - ***Discharger's annual average VPDES permit limits are 3.0 mg/l for total nitrogen and/or 0.3 mg/l for total phosphorus (or alternative limits, as required)***
  - ***BMPs are installed within locality served by new or expanded discharger, unless Board determines another location has greater water quality benefits***
  - ***Credit may be given for improvements to BMPs already required under other federal or state law, to the extent that additional load reduction is provided***

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Substance of Revisions to WQMP Regulation (9 VAC 25-720) *(details)*

- **Requirements that also apply if a new or expanded discharger uses offsets of nonpoint source BMPs (cont.):**
  - ***Credit may not be given for portions of BMPs financed by government programs***
  - ***BMP installation, monitoring and maintenance required by discharger's VPDES permit, and BMPs installed after permit issuance***
- **Trades and offsets must account for delivery factors, and recognize that new significant dischargers have no assigned waste load allocations.**

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Relationship between two Regulations

Example 1:

Significant discharger with capacity of 10 MGD

Permit limits as follows:

1. Concentration of TN = 8 mg/l

2. Load allocation of 120,000 pounds/year of nitrogen

- **4.5 MGD x 8.0 mg/l x CF = 110,000 pounds/year**
- **6.5 MGD x 6.0 mg/l x CF = 120,000 pounds/year**
- **10 MGD x 4.0 mg/l x CF = 120,000 pounds/year**

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Relationship between two Regulations

Example 2:

Same discharger expands to capacity of 20 MGD

Permit limits as follows:

1. **Concentration of TN = 3 mg/l now applies**
2. **Load allocation of 120,000 pounds/year of nitrogen remains the same**

- **12 MGD x 3.0 mg/l x CF = 110,000 pounds/year**
- **13 MGD x 3.0 mg/l x CF = 120,000 pounds/year**
- **15 MGD x 3.0 mg/l x CF = *140,000* pounds/year**
  - ***needs to trade or offset for 20,000 pounds/year***
- **20 MGD x 3.0 mg/l x CF = *180,000* pounds/year**
  - ***needs to trade or offset for 60,000 pounds/year***

Cost Estimates*

Capital cost estimates for significant dischargers to meet concentration and waste load allocation limits:

Basin	Nitrogen Control Cost (million $)	Phosphorus Control Cost (million $)	Total Nutrient Control Cost (million $)
Shen-Potomac	$457	$13	$470
Rappahannock	$91	$1	$92
York	$29	<$1	$30
James	$480	$6	$486
Eastern Shore	$13	<$1	$14
TOTALS	***$1,071***	***$21***	***$1,092***

NOTE:** ***figures are planning level, order-of-magnitude cost opinions, accurate from -30% to +50%

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Summary of Public Comments on NOIRA

- **Twenty-one sets of comments received, generally grouped into these major issues:**
  - **Suggested Numerical Limits**
  - **Allowance for Alternate Limits**
  - **Load Caps, Accommodating Growth, Economic Development**
  - **Trading and Offsets**
  - **Implementation Schedules**
  - **Industrial Dischargers**

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Key Issues Identified in Technical Advisory Committee Process

- **TAC composed of various stakeholder groups raised several key issues, including:**
  - **Bidding and Construction**
  - **“Bioavailability” of Nitrogen at Low Effluent Levels**
  - **Additional Solids Disposal**
  - **Small Facilities and Economies of Scale**

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Attorney General Certification

- **Final proposals have been provided to the Office of the Attorney General for certification**

QUESTIONS?

Staff Recommendations

- **Subject to the receipt of the certification from the Attorney General's office, the staff recommends the Board give approval to proceed to public hearing and comment on amendments to two regulations, as proposed:**
  - **Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed (9 VAC 25-40)**
  - **Water Quality Management Planning Regulation (9 VAC 25-720)**

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